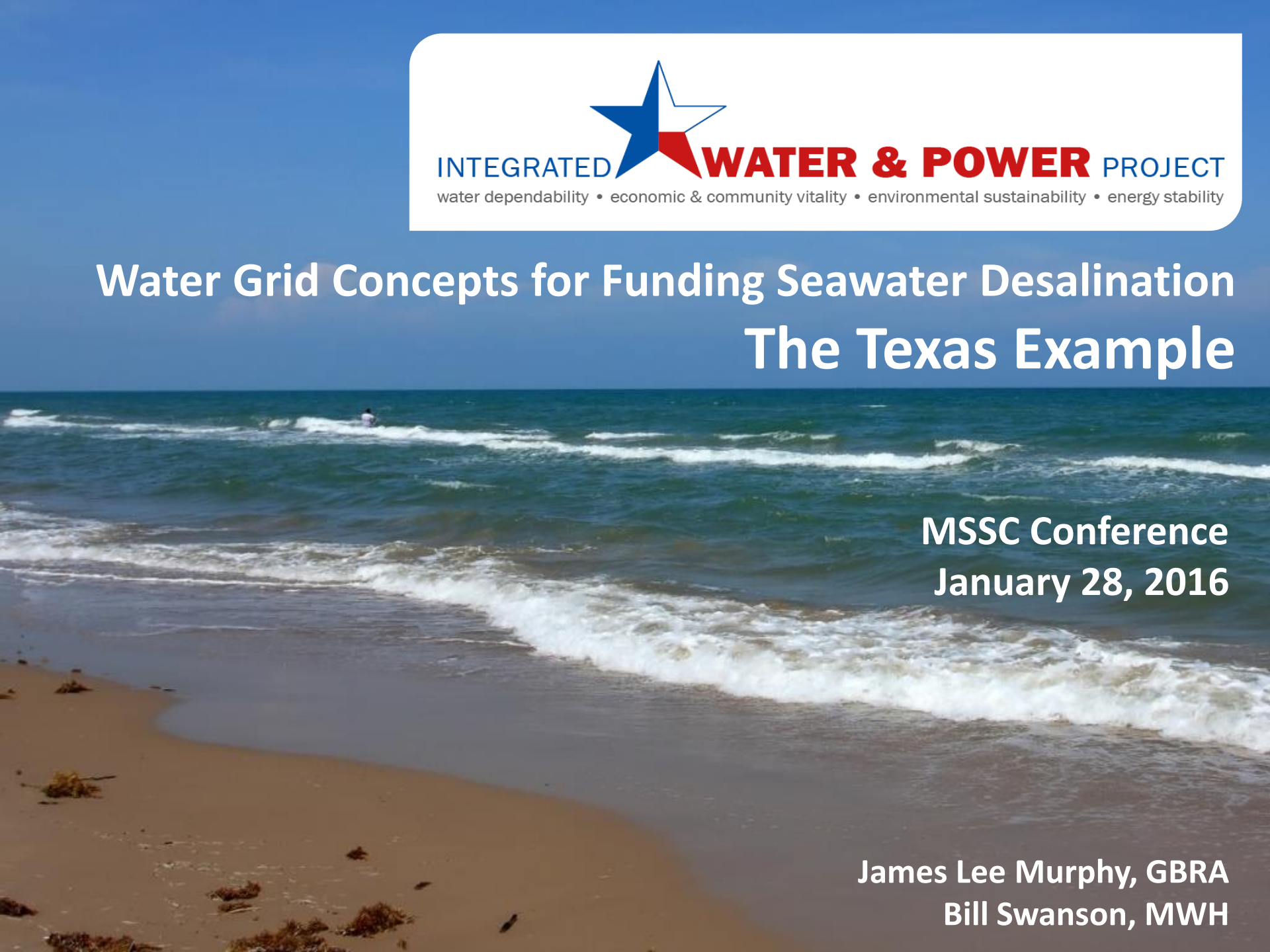
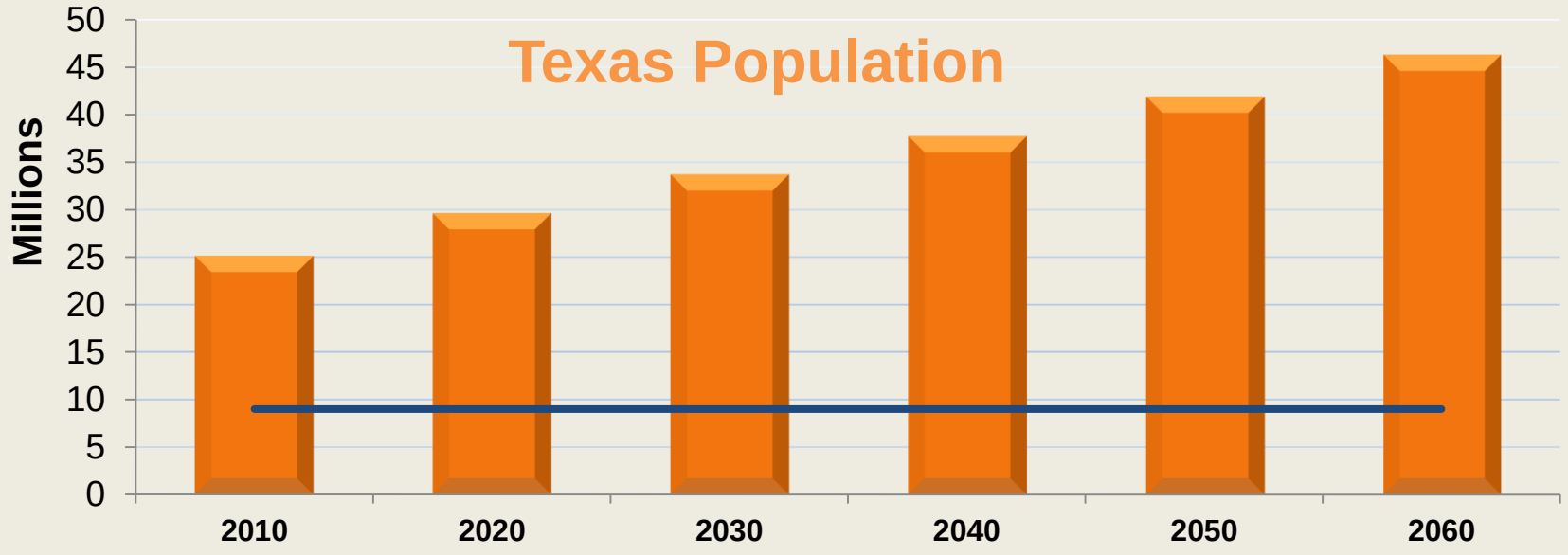


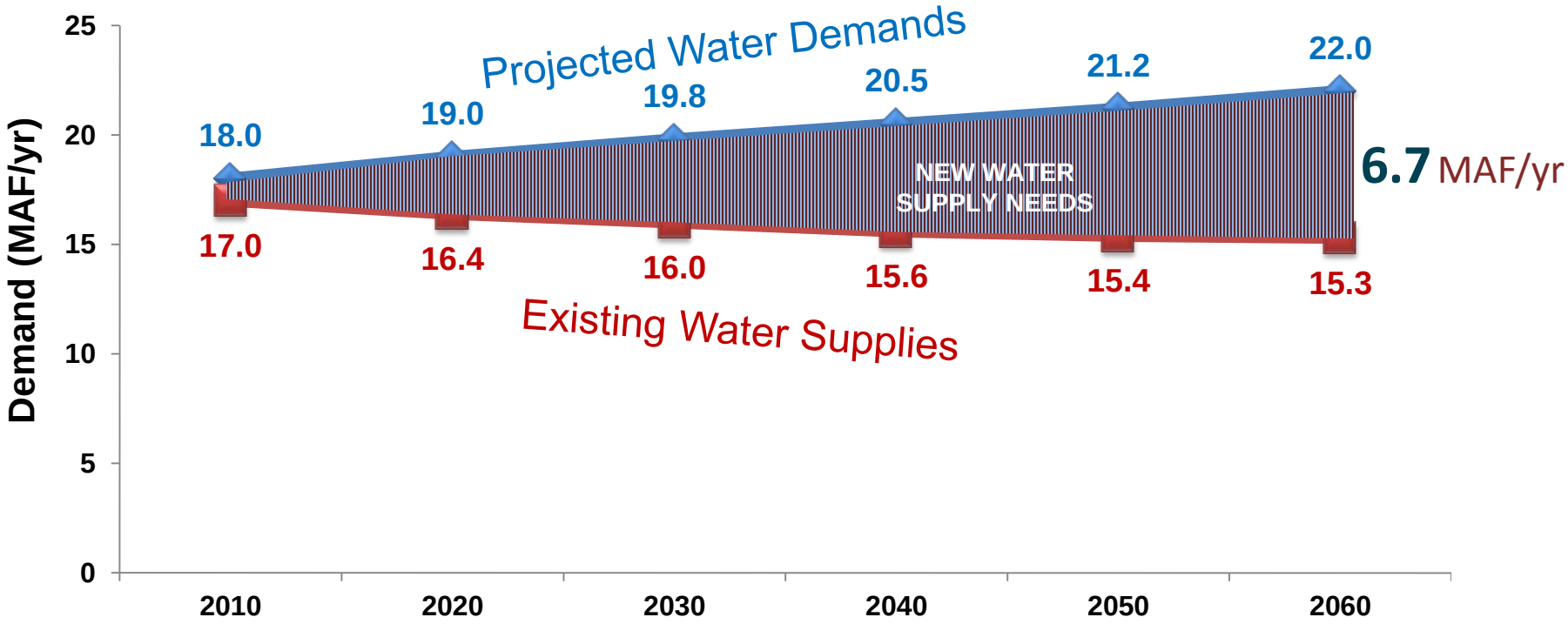

# Water Grid Concepts for Funding Seawater Desalination

## The Texas Example

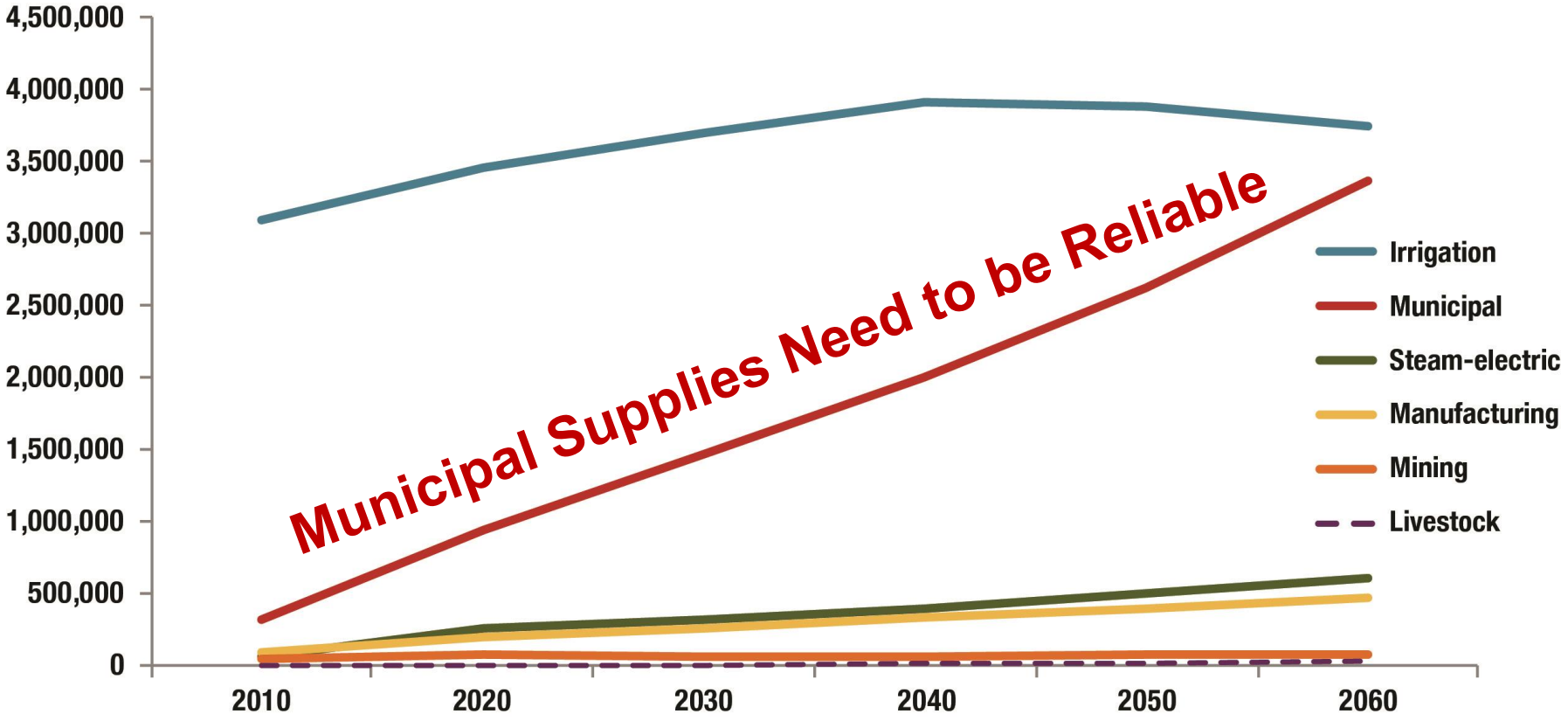
**MSSC Conference**
**January 28, 2016**

**James Lee Murphy, GBRA**
**Bill Swanson, MWH**


Texas Population
Millions
50
45
40
35
30
25
20
15
10
5
0
2010
2020
2030
2040
2050
2060


Demand (MAF/yr)
25
20
15
10
5
0
Projected Water Demands
18.0
19.0
19.8
20.5
21.2
22.0
NEW WATER SUPPLY NEEDS
6.7 MAF/yr
17.0
16.4
16.0
15.6
15.4
15.3
Existing Water Supplies
2010
2020
2030
2040
2050
2060

# Most Future Water Demands are for Municipal Use

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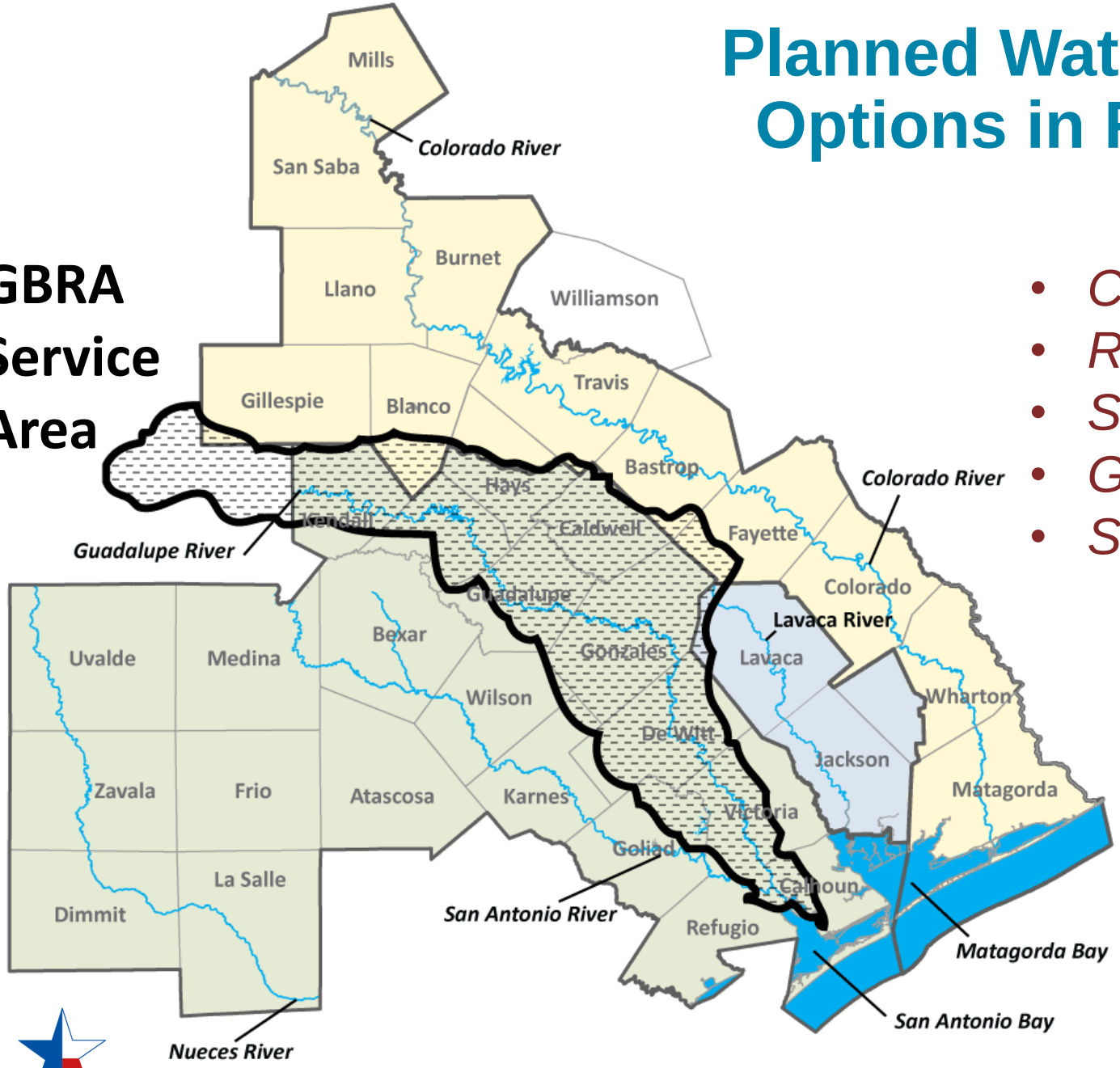
# Planned Water Supply Options in Region L

**GBRA Service Area**




- *Conservation*
- *Reuse*
- *Surface Water*
- *Groundwater*
- *Seawater*

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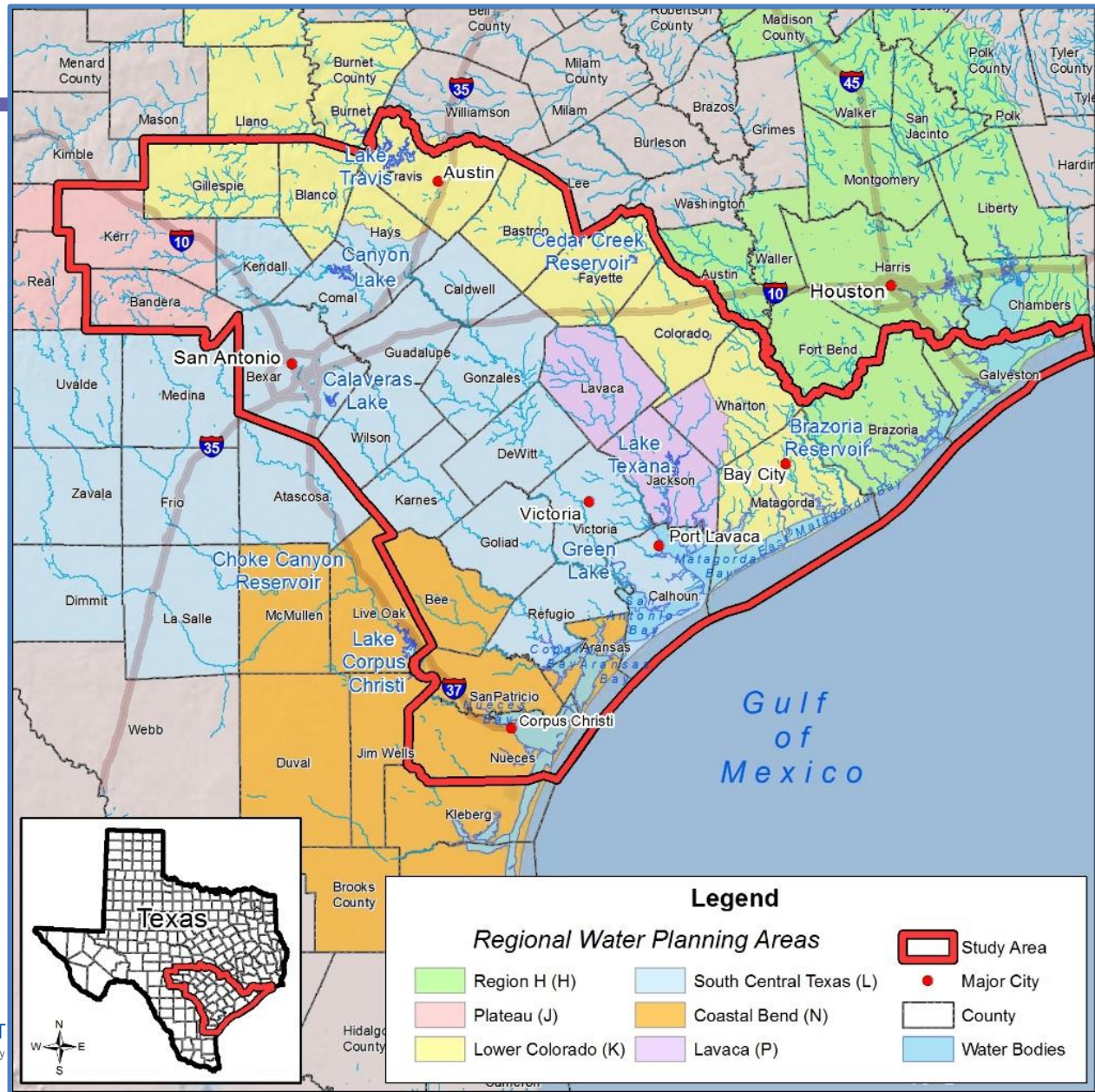
# IWPP Study Area

- 32 Counties
- 5 Major rivers
- 6 State Water Planning Regions (all or portion)
- 830 to 1,000 TAF/yr addition water demand by 2060

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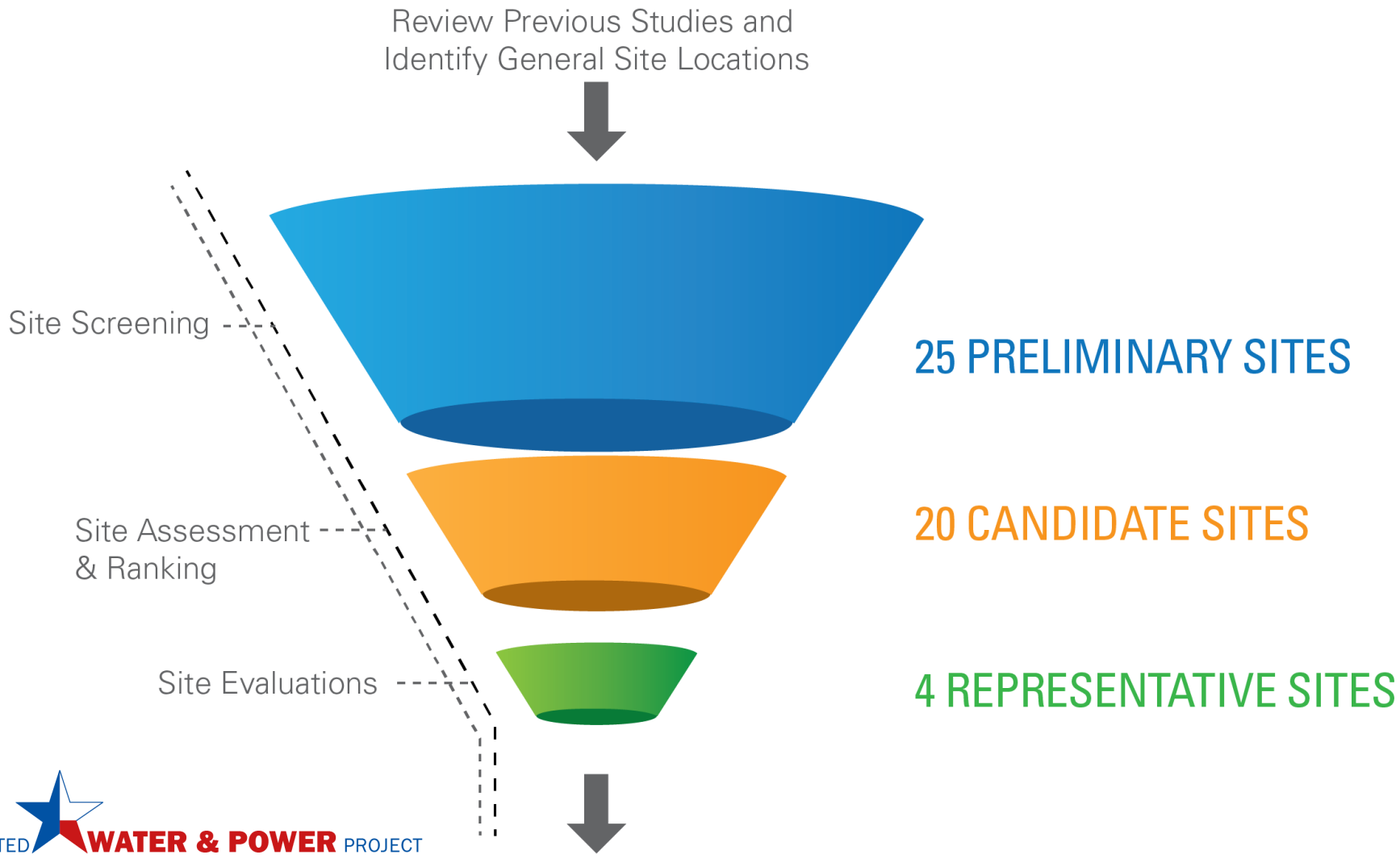
# Selection of Representative Sites

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# Site Evaluation Criteria

## General Site Conditions

- Available land area
- Topography and floodplains
- Land use compatibility
- Existing development
- Distance to intake and outfalls

## Proximity to Infrastructure

- Regional water conveyance
- Transportation (road, rail, ports)
- Gas pipelines or refineries
- Reliability of power facilities
- Power transmission

## Social Acceptance

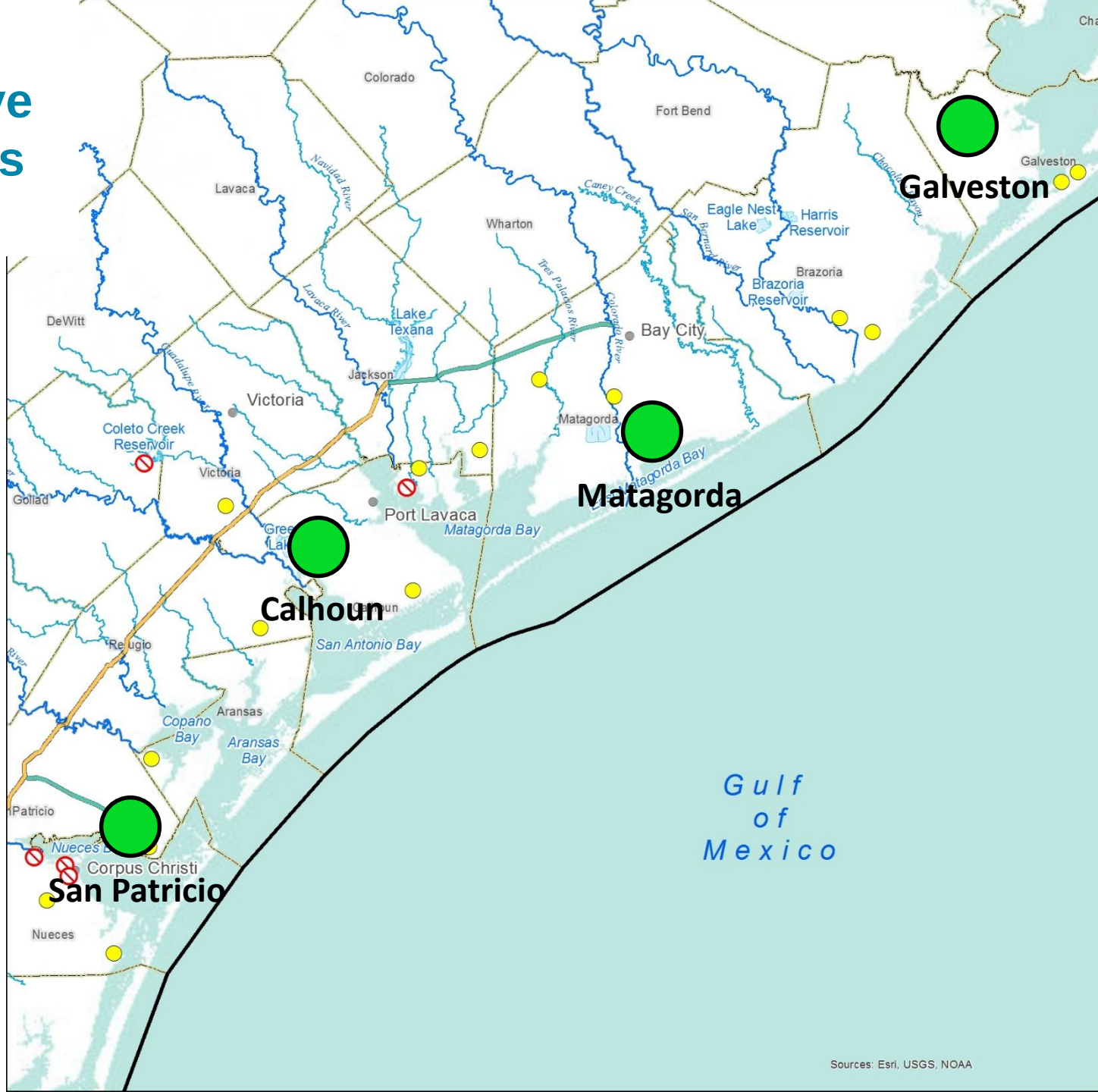
- Impacts to communities
- Indirect Impacts to wildlife
- Historical and cultural resources
- Public safety

## Environmental Stewardship

- Wetlands
- Endangered species
- Wildlife refuges
- Air quality
- Solids residual disposal

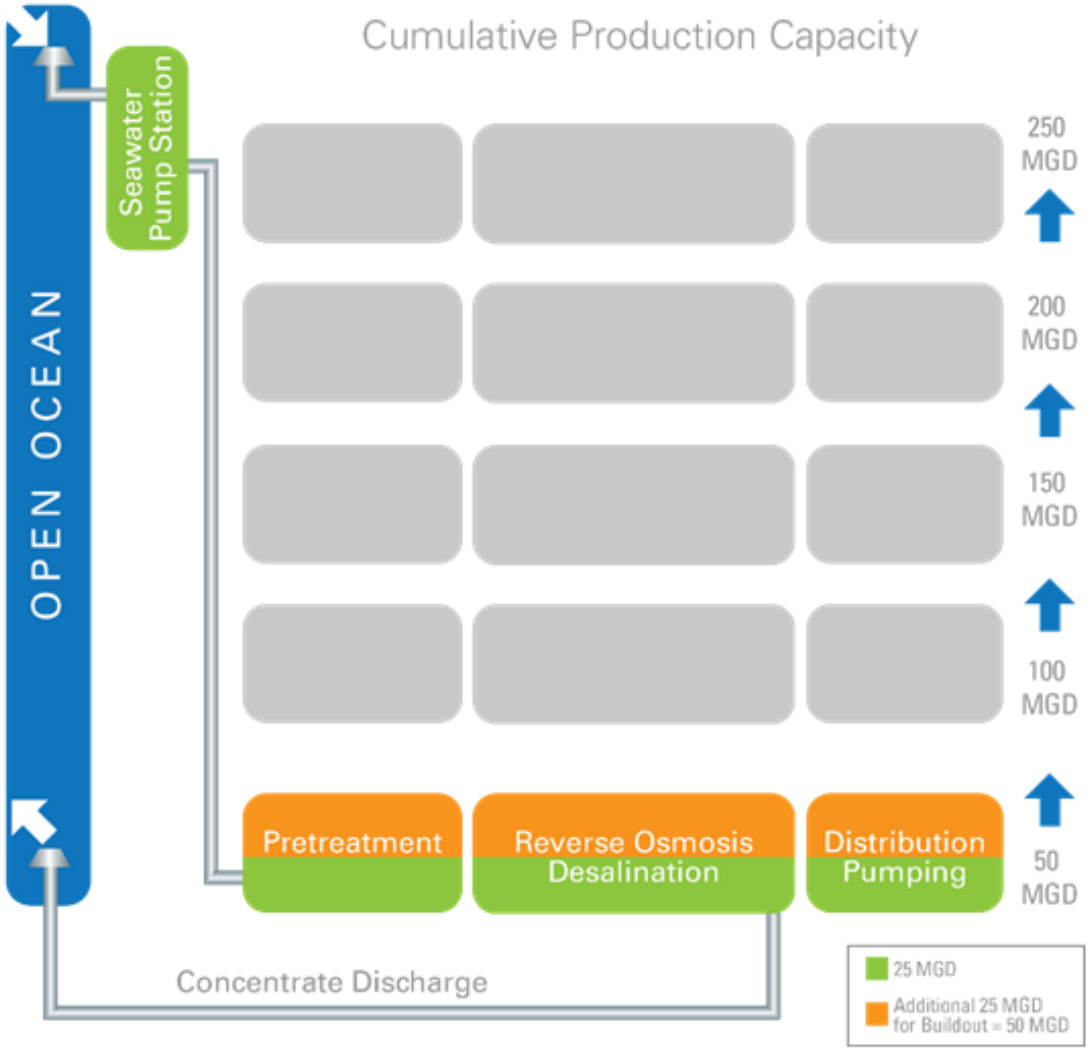
# Representative Site Locations

- **One site per county**
  - San Patricio
  - Calhoun
  - Matagorda
  - Galveston
- **Indicative of regional conditions and water integration opportunities**



# Water Treatment Capacity Phasing

- Modular development
- 25 MGD to 250 MGD
- Potable and Industrial water quality

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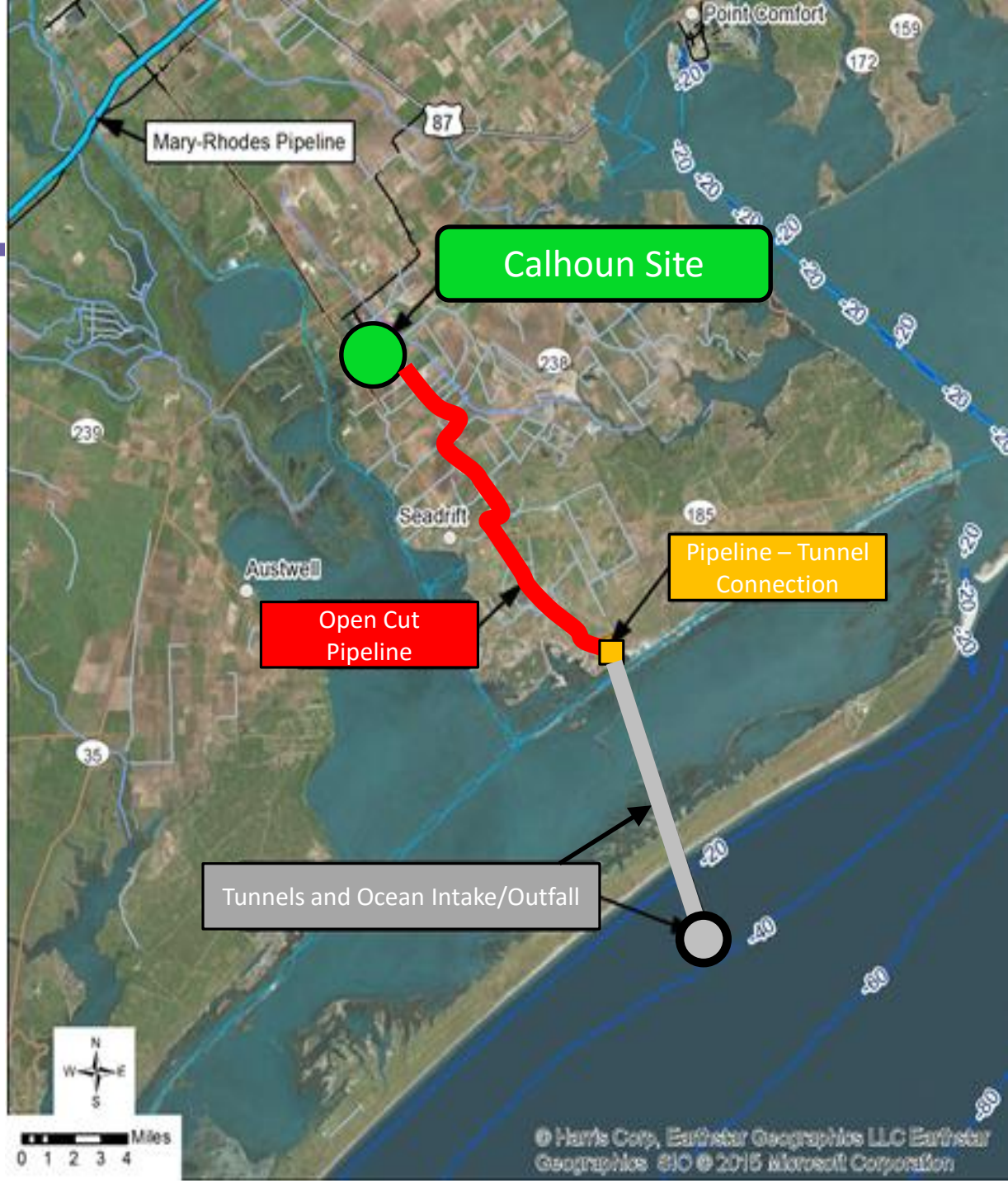
# Representative Site in Calhoun County Site

- Open-Cut pipeline
  - 15 miles
- Tunnels
  - Intake 10.5 miles
  - Outfall 11 miles
- 100 MGD Capacity
  - 12’ Intake
  - 10’ Outfall

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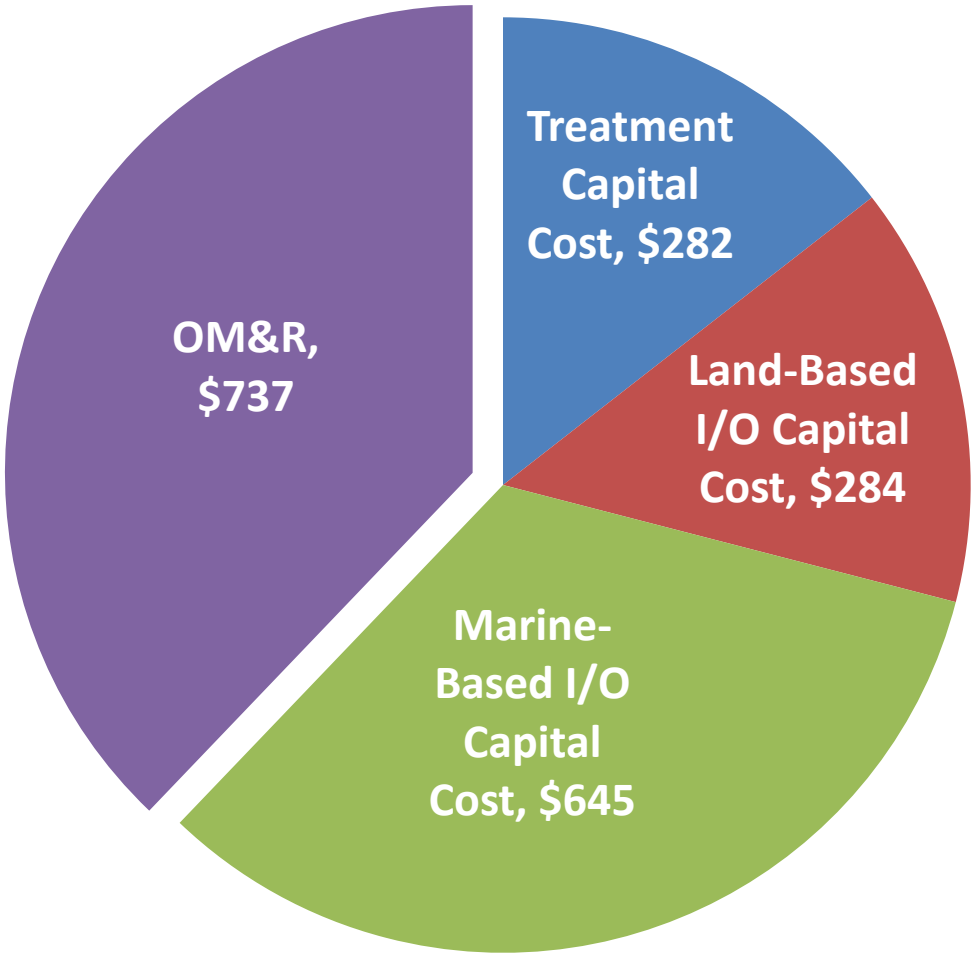
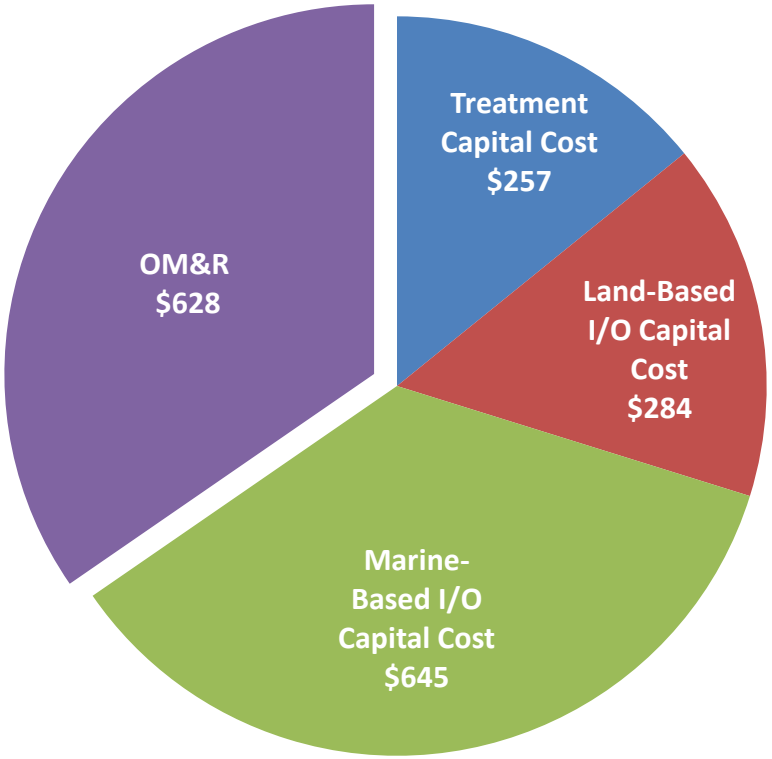
# Water Cost without Distribution

| Item | Assumption |
|---|---|
| Treatment | Potable |
| Cost of Power | $0.10/kWh |
| Delivery Conveyance | NONE |
| Total Capital Cost ($M) | $2,085 |
| Financing | 5%<br>30 years |
| Cost of Water ($/af) | $1,948 |



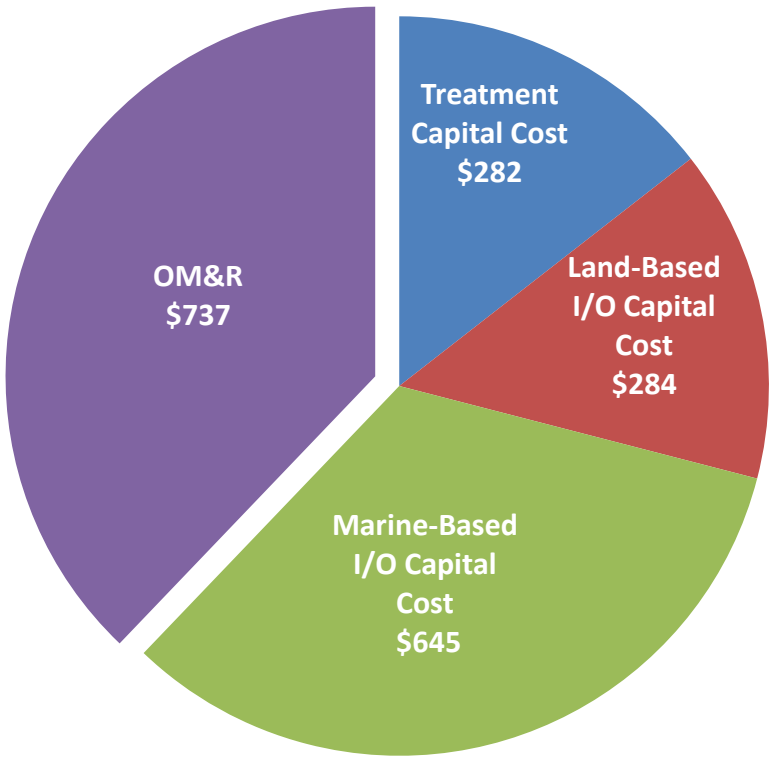
# Cost Sensitivity to Treated Water Quality

## Industrial Raw Water




**$1,814/af**

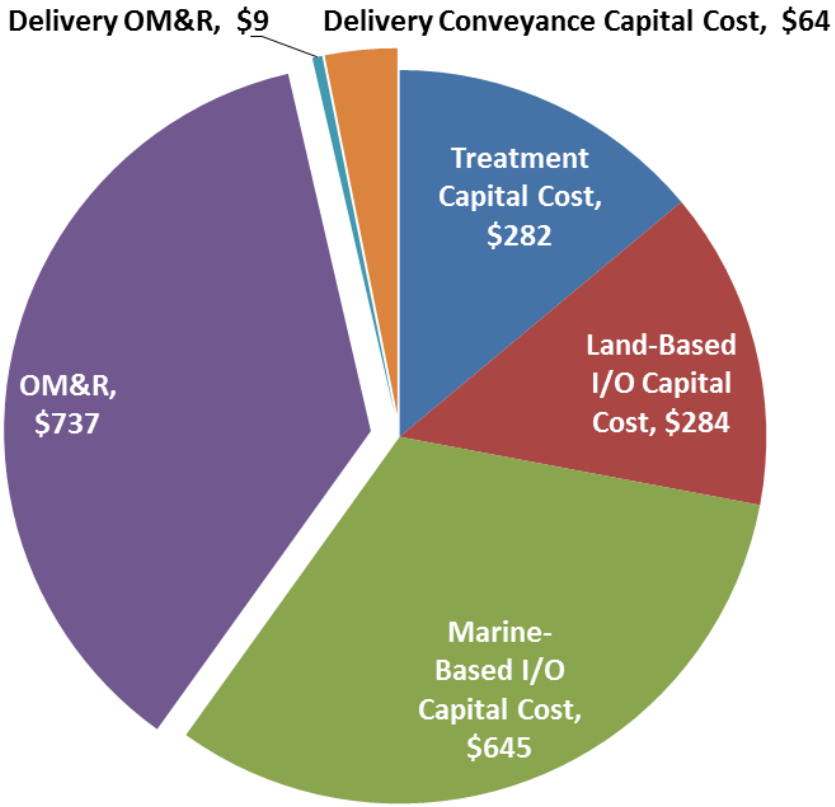
## Potable Water




**$1.948/af**

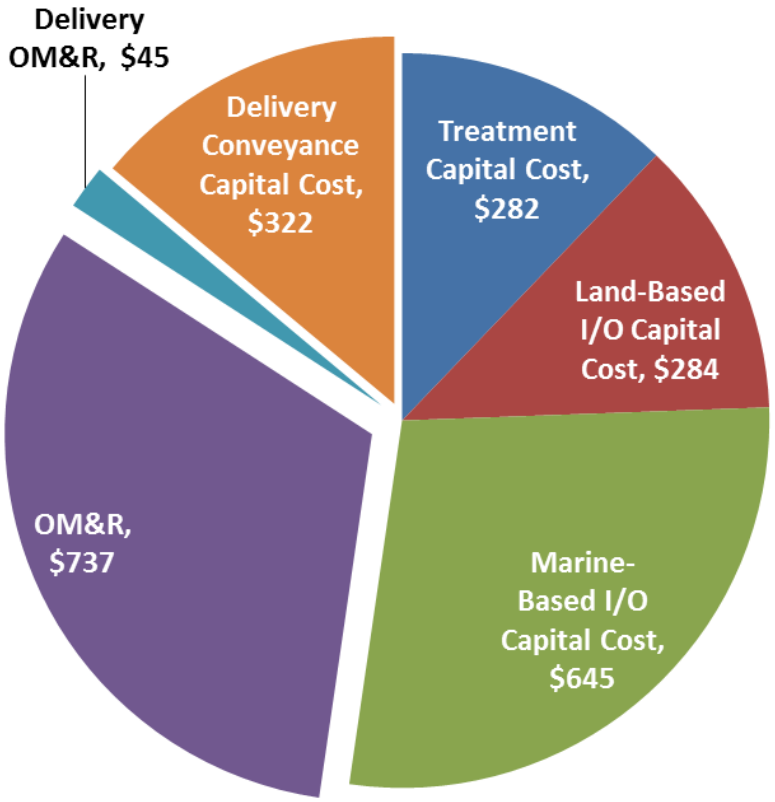
# Cost Sensitivity to Delivery System

## 10 Mile Delivery Pipeline




**$2.022/af**

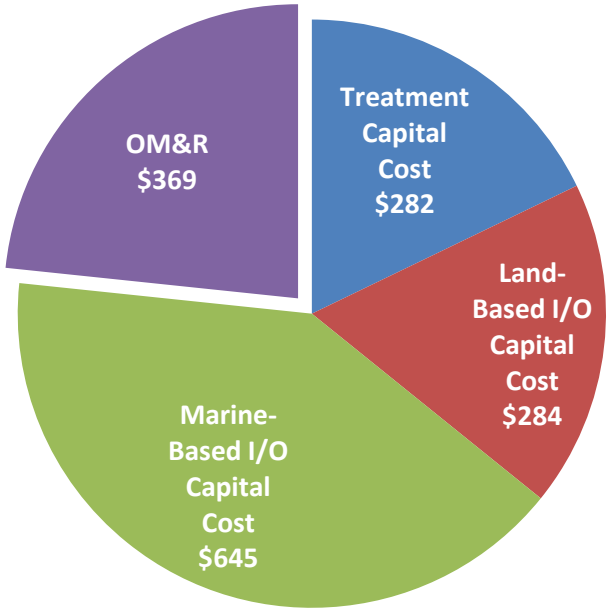
## 50 Mile Delivery Pipeline




**$2.315/af**

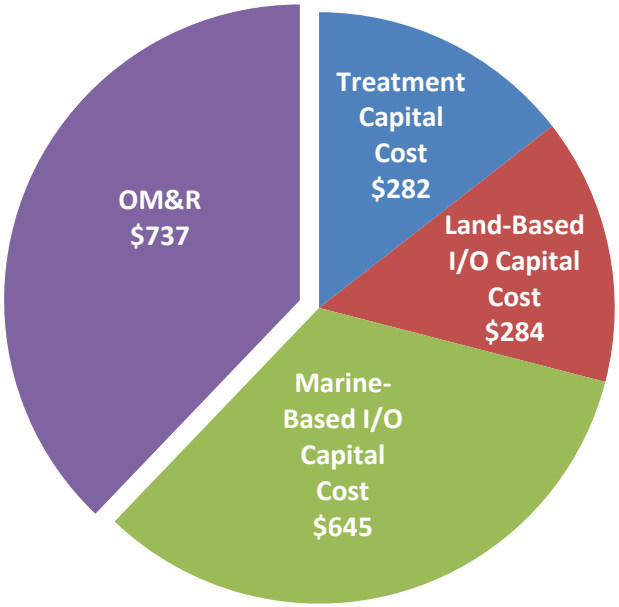
# Cost Sensitivity to Power Price

**$0.05/kWh**



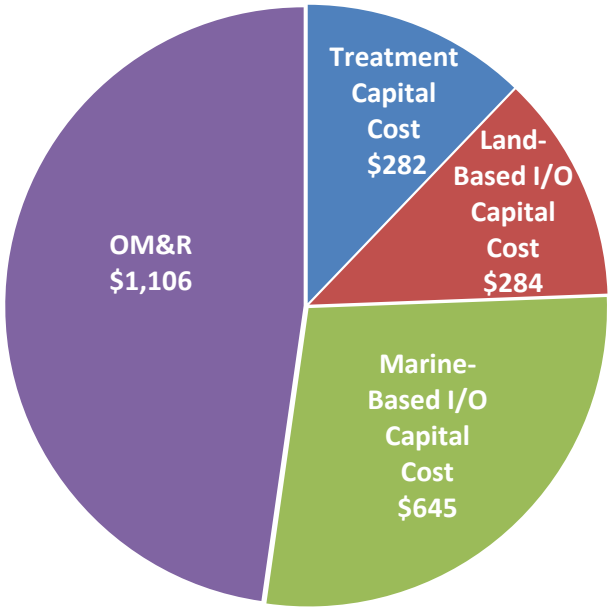

**$1,580/af**

**$0.10/kWh**




**$1,948/af**

**$0.15/kWh**




**$2,317/af**

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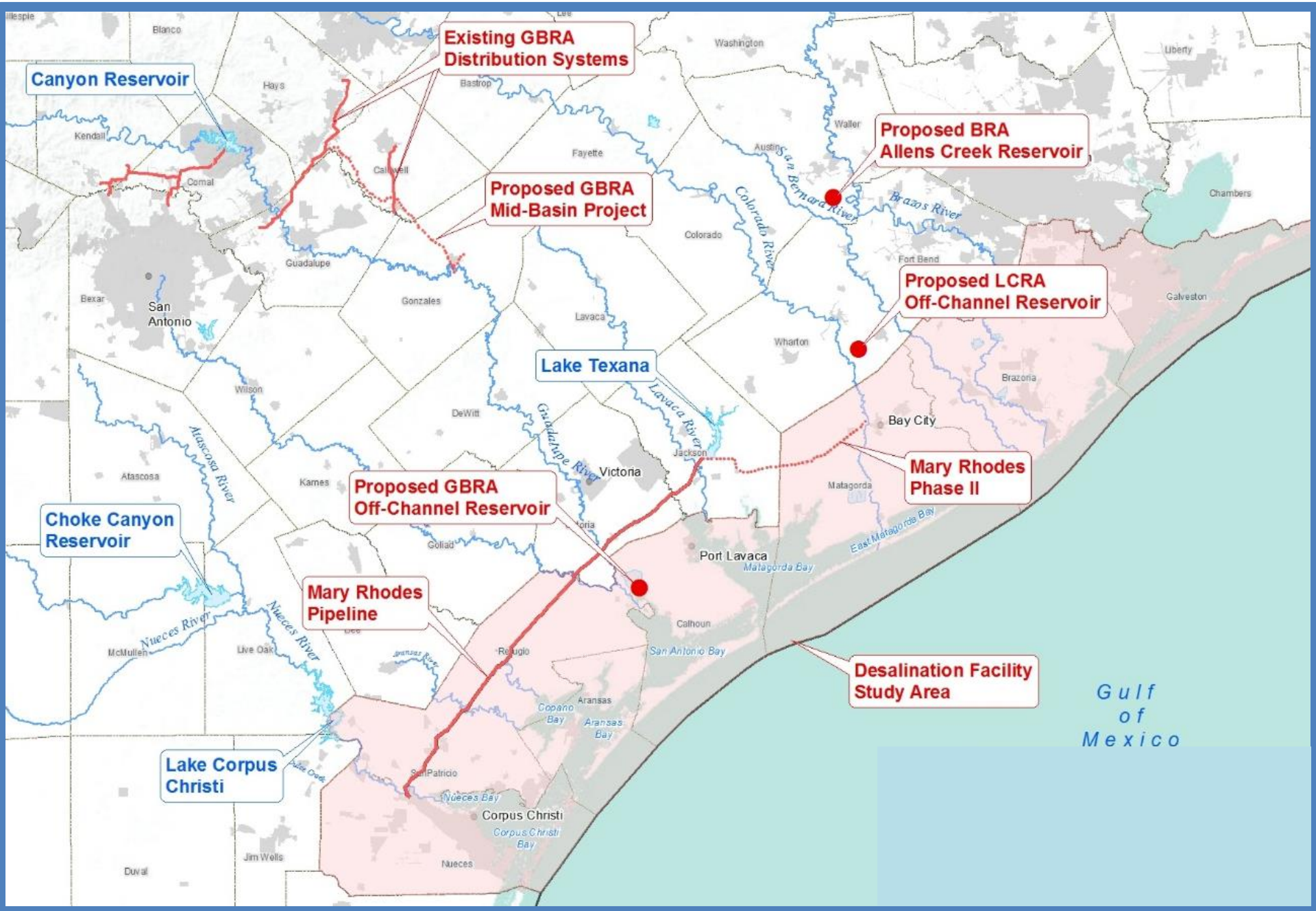
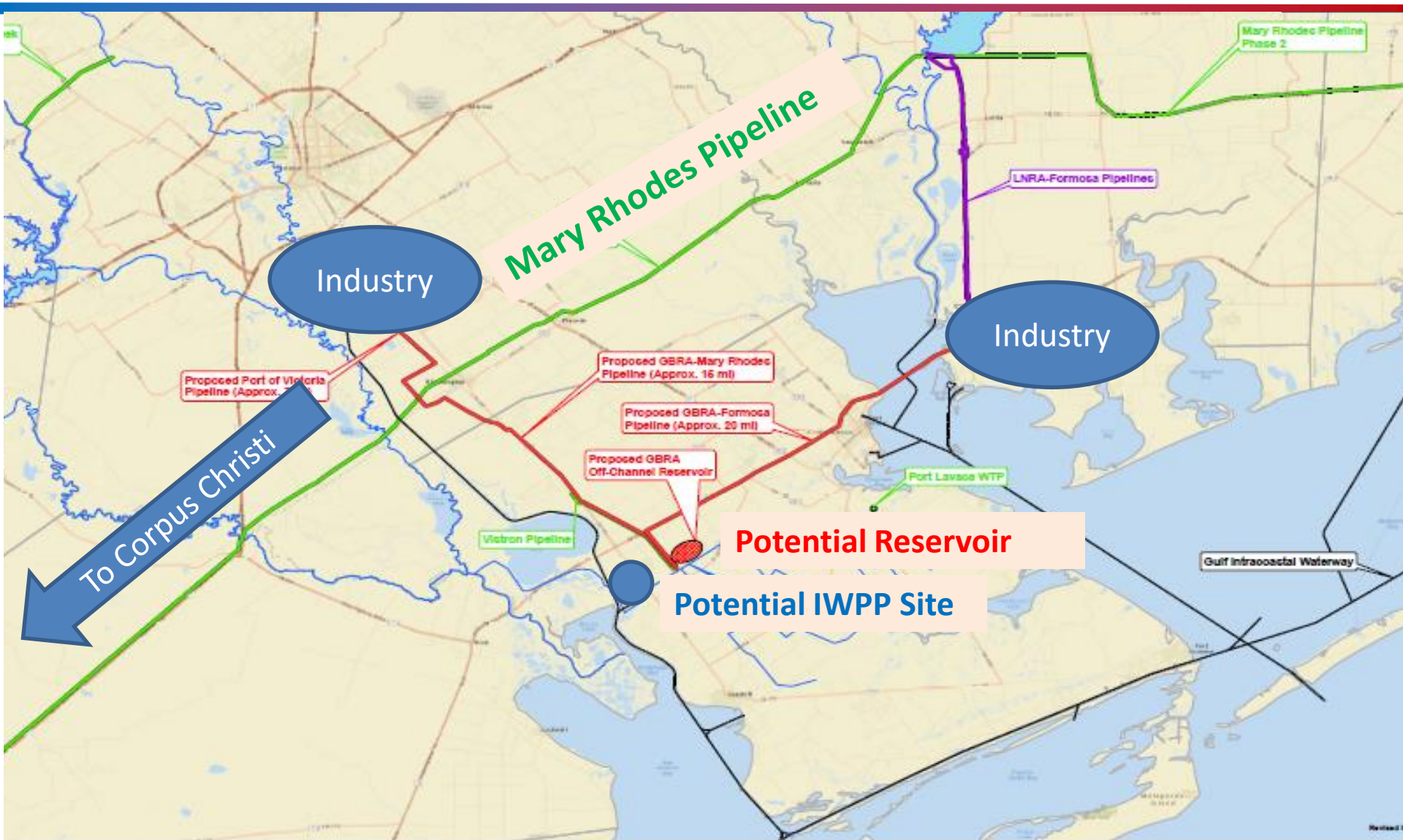
# Next Steps for IWPP Feasibility Study

- Consider alternative intake types
  - Beach wells or infiltration galleries
  - Corresponding plant sizes
- Energy alternatives
- Permit requirements
- Customer commitments
- Regional integration
  - Regional infrastructure
  - Lower Basin Project
  - River operations

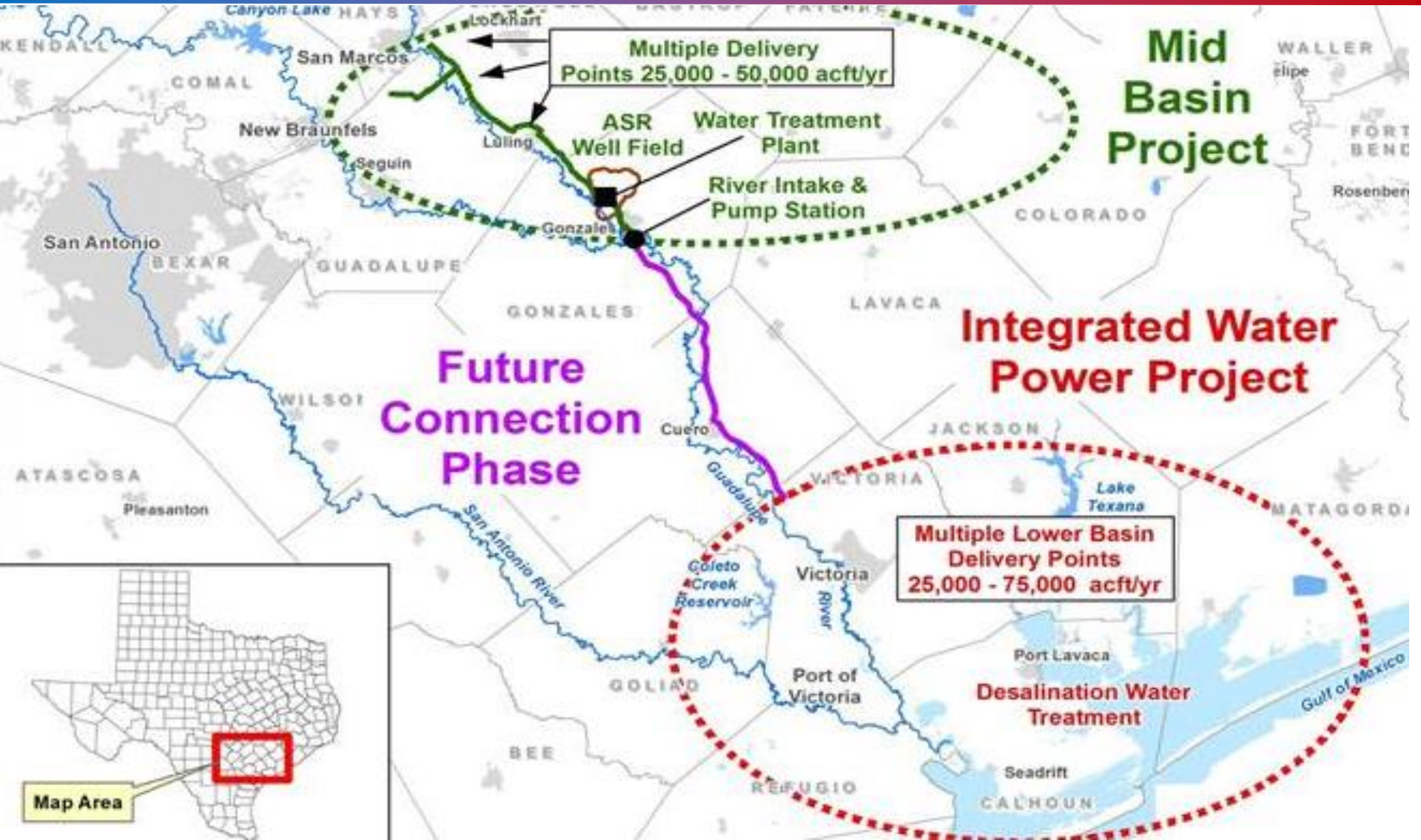
# IWPP As A Regional Water Resource



# Regional Integration of IWPP and Lower Basin Project



# Linking the Lower Basin Project, IWPP and the Mid Basin Project



# GBRA Actions in 2015 Help Position the IWPP as a Regional Project

- IWPP promoted to a recommended strategy in the Region L Plan
- HB 2031 establishes definitions and permitting requirements for marine seawater desalination
- TWDB awarded GBRA a SWIFT loan for continued IWPP development


Questions?